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**Some Farmers' Questions and their
Answers.**

By N. M. SMITH.

Question 1.—Does sulphate of ammonia evaporate if applied in dry weather?

Answer.—No. It is frequently observed that this fertilizer, applied during a dry spell, “disappears” before any rain falls. The fact is that the material is very easily dissolved in water and even a heavy dew will take it into the soil.

Question 2.—Does sulphate of ammonia, when applied to trash, help it to decompose?

Answer.—Yes. Decomposition of trash is carried out by soil microbes which must have a balanced food ration. One of these foods is nitrogen, and usually they are unable to get all they need from the nitrogen-poor trash. If sulphate is applied, this makes up the deficiency and rotting is thus speeded up. It is for the same reason that ploughing under a pea or bean crop, which is rich in nitrogen, has a similar influence on trash-rotting.

Question 3.—Why do ratoons often show a sickly, yellowish colour in their early growth stages?

Answer.—This follows on the answer to the previous question. After plant cane is harvested there remains in and on the soil a mass of roots, trash, &c., which are rotting, and soil nitrogen is being used in the process. The young ratoons may thus be temporarily starved, and the yellow colour is the sign that this is happening. An early application of sulphate of ammonia will overcome the trouble.

Question 4.—Does the appearance of a white or partially white shoot indicate a “sickness” or absence of something from the soil?

Answer.—No. Such shoots are really “freaks.” They are known as “albinos” because they lack colour. This is due to abnormal growths, and the failure of the shoot to produce chlorophyll (the green colouring substance in all higher plants). As chlorophyll is essential for growth, such shoots cannot survive. They are quite often observed in Java canes, which are “hybrid” in character.

Question 5.—Does the continued use of fertilizer ruin the soil?

Answer.—No. Fertilizers must be considered simply as concentrated forms of plant food which are applied to the land to correct any deficiencies it may possess. Provided the correct balance of foods is applied, appropriate to the need of the particular soil, improved crop growth is usually the result. If one material—say, sulphate of ammonia—is applied alone, it may after a time cease to produce results, because some other food has then become a factor limiting growth. Sulphate of ammonia does tend to make the soil acid, and those lands which exhibit this characteristic should be given an occasional dressing of lime to correct the trouble.

Question 6.—Is there any potash in the ash from trash?

Answer.—All ashes contain a proportion of potash, and it is often found that the ash which remains after “burning-off” contains a high proportion of what was used by the cane during its growth. Of course the ash becomes beneficial to the soil if it is worked in soon after the burn. If allowed to remain until winds have removed the fine ash particles, the benefits will be lost; and in these times of potash shortage the farmer should take no chances. In many countries, such as the Balkan States, a customary method of applying potash to the land is to pile brush and other waste material on the land and burn it. The ash is subsequently ploughed in.

Question 7.—Does fertilizer lose any of its virtues during storage?

Answer.—No. Some of the ingredients of mixed manures are chemical salts, which absorb moisture during periods of rain or high humidity. The mixture may thus become damp or wet, and when it dries again the contents of the bag set hard. This is not detrimental to the manure, even though it is necessary to break up the lumps before it can be put through a distributor. Fertilizer should always be stored in a dry shed and well protected against rain, for if any water washes through the bags it will remove soluble plant foods and they may become lost as a result.

Question 8.—What is fertilizer burn?

Answer.—Large, irregularly shaped, brownish, dead patches may often be observed after fertilizer has been applied as a top dressing to a growing crop. This is due to fertilizer (chiefly sulphate of ammonia) being dusted on to the leaves and killing the leaf tissue on which it falls. These effects soon disappear as new leaves are produced.

An unseen form of fertilizer burn may occur when fertilizer is placed in contact with setts in the drill; the young roots and shoots may then be scorched and killed when they meet the fertilizer; this form of burn is not so common, now that sulphate of ammonia is mainly applied as a top dressing.

Question 9.—What is wind burn?

Answer.—Leaves of rapidly growing cane are somewhat sensitive to the drying effects of wind, and a hot day, with drying winds, may wither the tips and margins of the leaves. In more severe cases the outer leaf in the spindle—that is, the youngest exposed (but not unfolded) leaf—may be killed almost down to the base. When these apparently dead hearts suddenly appear all over the field the occurrence often causes considerable alarm, but a close examination shows that the heart is sound and only the one leaf killed. Wind burn is most common

when a hot, dry, windy day follows a period of rain, especially if the crop has been recently top dressed with sulphate of ammonia and is growing rapidly and succulently. The old variety H.Q.285 or Milton was particularly susceptible to wind burn.

Question 10.—Is lime a fertilizer?

Answer.—Though not usually classed as such, it is, strictly speaking, a source of an important plant food. However, as used by the farmer its prime function is either to destroy harmful acidity in the soil—this may exist in the best-drained lands—or to improve the properties of low-lying, poorly-drained land. That is, it “sweetens” a “sour” soil. It has the capacity to open up the soil and allow excess moisture to drain away. Air can then get into the soil and complete the “sweetening” process.

Question 11.—When is the best time to apply lime?

Answer.—It may be applied at any time except immediately before or immediately after an application of sulphate of ammonia. It is very convenient to broadcast it on the trash before ploughing out an old ratoon field. The trash may then be ploughed in with the lime, or burnt off if desired. This will not harm the lime. Spreading between cane rows or on ploughed land is equally effective. It will not damage cane foliage if it comes into contact with it; this applies even to burnt lime. In high rainfall districts it is a good plan to apply the lime on the surface, just before planting, and lightly harrow. Under these conditions rains will quickly dissolve the lime and help it do its useful work.

Question 12.—Does arrowing signify that the cane is ripe, and that the C.C.S. will drop if it is not harvested immediately?

Answer.—No. When a cane stalk produces an arrow it cannot make any further cane, except by side-shooting. But it can continue to build up sugar in the stick, and this may go on for several months after arrowing. P.O.J.2725, for example, often arrows early in May, but the C.C.S. is not at its best until September. It is not correct that the cane is ready to cut six weeks after arrowing.

Question 13.—Does a cane variety tend to “run out”?

Answer.—There is no evidence that a cane variety deteriorates due to any other cause but disease. This may be disease of the stalk, leaves, or roots. Badila is probably the oldest cane at present in cultivation in Queensland, and just as good specimens of the variety can be found to-day as existed forty years ago. More often than not lack of vigour of a cane may be traced to indifferent nutrition, owing to lack of the correct plant foods or other conditions in the soil. Soils certainly “run out,” unless carefully tended.

Question 14.—(a) What is “sooty mould,” (b) its cause, (c) its effect?

Answer.—(a) Sooty mould is as its name suggests—a black, sooty-like substance not unlike the fine soot found in chimneys, &c. It is to be located on the leaves, leaf sheaths, and the stalk, giving the plant a poorly grown, sickly, and shabby appearance. The “soot” may be easily rubbed off the leaf with the finger, and when examined under a microscope is seen to be a fungus. Sooty mould is also common on the leaves of citrus trees.

(b) If the neighbouring leaves are examined it will be found that there exist colonies of small yellowish aphid, the cane aphid, which exudes a sticky fluid; this is known as "honey dew" and is excreted by the aphid. Because of its sugary nature, the particular fungus thrives on it, and as it matures it turns black, so giving the sooty appearance. The common "lady-birds" prey on the aphid and are generally also found on the cane leaves.

(c) A heavy infestation of the aphid with consequent production of sooty mould stunts the plant, due to exclusion of sunshine and clogging of the breathing pores. Poorly grown crops are those most likely to become affected. Populations of the insect build up during dry weather but decline after good rains.

Question 15.—Do some varieties of legume yield more nitrogen than others?

Answer.—The amount of nitrogen delivered to the soil in this manner varies widely. From some soils legumes are able to extract a proportion of nitrogen for their use, and under these conditions the amount fixed in the nodules of the roots will, of course, be reduced. Moreover, the luxuriance of growth, which should be the farmer's chief concern, will be governed by such factors as moisture and the supply of other plant foods. Although the nitrogen is not absolutely related to the weight of green matter, it is safe to assume that the bigger the crop the better the results. Farmers should therefore select the legume which grows best on their lands and provide them as far as possible with good growing conditions.

Permits Necessary for Planting Maize in the Bundaberg District.

Quarantine measures controlling the planting of maize are still applied to the Bundaberg district. The quarantine area includes the general mill areas of Millaquin, Qunaba, Fairymead, Bingera, and Gin Gin, but the exact boundaries of the area may be seen at the office of the Bundaberg Cane growers' District Executive.

Within this quarantine area it is illegal to plant maize unless a written permit has first been obtained from the Chemist-in-Charge of the Bundaberg Sugar Experiment Station. Each application will be judged on its own merits in respect of the distance from known sources of downy mildew infection. Sympathetic consideration is given to applications, as may be judged from the fact that last season permits to plant a total of 2,596 acres were granted to no less than 564 farmers.

On the other hand, no leniency can be shown to farmers who plant maize without a permit or who plant an area in excess of that granted in a permit. It should be noted in passing that a farmer who last year planted maize without a permit was convicted and fined for the offence. The Bundaberg Cane Disease Control Board has stated that much of the recent improvement in the sugar cane downy mildew position may be attributed to the prohibition of planting maize near diseased fields of cane.

Applications, stating the acres of maize it is desired to plant, should be addressed to "The Chemist-in-Charge, Sugar Experiment Station, P.O. Box 138, Bundaberg."

A.F.B.

Frenchi Grub Attacks.*

By R. W. MUNGOMERY.

DURING the past few seasons, at least in the Mulgrave and Hambleton areas, Frenchi grubs have been so destructive in their attacks against certain fields of cane that it was thought opportune to bring before the notice of Supervisors some of the more obvious factors which go towards the establishment of this pest on many farms and its persistence there once it has gained a foothold.

At the outset it should be realised that this pest has a two-year cycle, and with the exception of the egg, pupal, and adult stage, all of which occupy a period of some three to five months, the remainder of this two-year period is occupied in the grub stage. This grub stage, however, is not one of continuous activity, but in the winter period of the first year activity is interrupted by a period of rest or hibernation, and in the second year by a similar resting or prepupal stage. During the period when the grub is active it is to be found busily gnawing at the cane roots within a range comparatively close to the surface, but the resting period is spent at depths from 15 inches to 21 inches, i.e., usually well below plough depth. These points concerning the location of grubs in the soil should be kept in mind since they have an important bearing on control measures, for on a correct understanding of the pest's reaction to seasonal changes depends the success of any cultural control operations.

Reference has previously been made to the fact that Frenchi beetles feed on the foliage of Moreton Bay ashes, bloodwood, and guava trees, and one of the obvious control measures is to cut down, poison, or otherwise destroy these trees, so that the beetles will be deprived of their normal food supply and be forced to leave the area. In some parts attention has recently been paid to this aspect of control by the destruction of all known feeding trees within a certain radius of some farm or farms, and it is felt that an opportunity exists in other parts for the effective clearing of these Frenchi harbourages, which can be destroyed at a reasonable cost. Still, it must be admitted that it is as yet too early to assess any benefits accruing from clearing work undertaken solely to control the Frenchi grub.

Mr. Buzacott, in a paper to the 1938 Conference, discussed the difficulties connected with the fumigation of these pests in the dry spring months, and small experiments carried out last year still lead us to adhere to the views then expressed.

There is, however, another aspect of control that does not receive the attention it warrants, and that is cultural control; and it is contended that if growers would pay more attention to this question, combined with the important aspect of feeding tree destruction, Frenchi grubs should not prove such formidable problems as they at present appear.

One of the chief means of control is to plough the land during the period when the grubs are located near the surface or at least within plough range. The plough dises cut a certain number of grubs, injure others beyond hope of recovery by their crushing effect, whilst others are exposed on the surface, where they are eagerly snapped up by any birds that happen to follow the plough. Counts behind a single furrow

* Paper presented at the 1941 Conference of Cane Pests Boards.

disc plough revealed that approximately 50 per cent. of the grubs were either killed, injured, or exposed to attack from birds. If two or three ploughings are made during the late spring, summer, or early autumn period when the pests are active, the grubs are usually reduced to such small numbers that it is safe to plant, and the crop should remain reasonably free from severe grub damage for some years.

Let us examine briefly the manner in which these pests increase, and for the purpose of illustration let us assume that we commence planting a block of land when the population per unit of area amounts to two grubs in each of two consecutive generations, and let us assume further that there is an equal sex ratio, that the progeny per beetle is 24, and that no natural mortality occurs prior to reproduction.

Pest position at commencement of planting operations, spring, 1940 = 2 second-stage grubs and 2 pupae.

Pest position at maturity of plant crop, spring, 1941 = 24 second-stage grubs and 2 pupae.

Pest position at maturity of first ratoon crop, spring, 1942 = 24 second-stage grubs and 24 pupae.

Pest position at maturity of second ratoon crop, spring, 1943 = 288 second-stage grubs and 24 pupae.

Pest position at maturity of third ratoon crop, spring, 1944 = 288 second-stage grubs and 288 pupae.

Pest position at maturity of fourth ratoon crop, spring, 1945 = 3,456 second-stage grubs and 288 pupae.

Of course, various mortality factors do occur from year to year and the hypothetical case outlined above never actually occurs, but on the other hand the degree of severity of the infestation throughout the various years remains, up to a point, roughly, of the same order, and one can visualise just how severe is the infestation at the end of the second ratoon crop or the beginning of the third ratoons unless the latter are ploughed out as they should be in a normal rotation.

If, however, the second ratoon crop is cut early, i.e., June or July, and ploughed out and worked up for a September re-plant, the majority of the grubs, being beneath plough depth, receive no check and are ready to attack the young plant cane just as it is striking. Thus the plant crop is faced with a Frenchi grub population such as one might expect in a young third ratoon crop and the field is doomed from the outset. In addition, it becomes a breeding centre from which other nearby blocks become infested.

Due to the necessity for getting rid of disapproved varieties after the second ratoon crop, or to the failure of some varieties to ratoon satisfactorily, many blocks of cane have been ploughed out and replanted, whilst in other cases, in order to keep up a high net acreage for certain mill peaks, the ratoons of some approved varieties have been unduly prolonged. The lengthening of the number of ratoons has often been carried out because other blocks on the farm have become grub infested. All of these factors only aggravate the position and contribute towards increased Frenchi populations and damage.

Where Frenchi grubs are known to be bad in any particular block, ploughing should be carried out in the period between late spring and early autumn. There is a certain amount of objection to this procedure

owing to the possibility of soil erosion occurring, but unless the slope is great, and if trash, &c., has been ploughed under to help hold the soil, erosion is usually not so serious as might be imagined.

Planting should be carried out in autumn. This usually ensures a good strike and allows the cane to become well established. Late spring planting is often undertaken to avoid or lessen greyback grub attack; but this is not always a positive method of circumventing attack, and very often this scheme, if adhered to too rigidly, may become the means of inducing severe Frenchi damage.

Above all, refrain from ratooning too often, for the previous illustration reveals how quickly the pest builds up when it is unmolested over a number of years.

Proposed Alterations in Approved Variety Lists.

Hereunder are set out the alterations which it is proposed to make to the existing lists of approved varieties when the new lists are issued early in January, 1942. **Once the 1942 list has been gazetted it cannot be altered until a new list is gazetted in 1943;** therefore any protests against these proposed alterations, or requests regarding the approval of other varieties, should be forwarded to the Director immediately. All such requests should be supported by a detailed statement of the evidence which may be cited in support of the case presented: generalised or hearsay reports cannot be accepted as a basis for making further amendments.

It will be seen from the subjoined list that only minor changes are proposed in the 1942 list and consist in the exclusion of varieties which have already been practically excluded from plantings by the cane-growers themselves:—

Marian Mill Area.

P.O.J.2725 will be removed from the approved list.

Fairymead Mill Area.

Oramboo, Korpi, and Q.813 will be removed from the approved list.

Millaquin Mill Area.

Oramboo and Korpi will be removed from the approved list.

Qunaba Mill Area.

Q.813 and Korpi will be removed from the approved list.

Isis Mill Area.

Q.813 will be removed from the approved list.

Moreton Mill Area.

Korpi will be removed from the approved list.

No exclusion is contemplated in the lists for any mill area not mentioned above.

A.F.B.

Frost Reaction of Q.25.

BY ARTHUR F. BELL.

THERE having been no frosts to speak of since the variety Q.25 was bred we naturally knew virtually nothing regarding its frost resistance until this year. For the information of farmers in Southern Queensland we have tabulated below the observations made on Q.25 and an adjoining standard variety on ten farms selected at random in the Millaquin-Qunaba area, viz. :—

Location.	Q. 25.	Standard Variety.
Germantown Road..	Only older leaves affected ; no damage to heart*, growing point or eyes	P.O.J. 2878. As for Q. 25
Germantown Road..	Older leaves badly affected ; heart killed, growing point alive, top buds swelling	P.O.J. 2878. Oldest leaves dead ; no damage to heart or eyes
Lovers' Walk ..	Bad leaf damage ; heart killed but growing point alive ; eyes shooting where tops severely affected	Co. 290. Slight tipping of leaves and few hearts dead ; no swelling or shooting of eyes
South Kalkie ..	Irrigated cane. Medium leaf striping and burn of older leaves ; top eyes commencing to swell	P.O.J. 2878. Irrigated cane. Only slight leaf burn and no effect on eyes
South Kalkie ..	Older leaves dead ; heart dead, but growing point sound and pushing up ; top eyes swollen or shot	P.O.J. 2878. Older leaves dead, some topmost eyes swollen or shot
South Kalkie ..	Badly scorched, heart dead, but growing point sound ; many eyes swollen or shot	Co. 290. Death of older leaves ; hearts, growing point and eyes sound
Barolin Road ..	Very severely affected ; rotting from growing point and commencing to pipe ; eyes good and top ones shooting	P.O.J. 2878. Severe leaf damage ; heart dead but no rotting ; top eyes shooting
Rubyanna ..	All older leaves dead ; heart dead, but growing point alive ; top eyes shooting but none dead	Q. 813. Little leaf damage ; heart and growing point unaffected ; a few stalks with eyes shot
Duncraggan Road ..	March Plant. Cut right back but coming away well from crown	P.O.J. 2878. March Plant. As for Q. 25 but behind it in regrowth
Rubyanna Road ..	Badly frosted, hearts dead, but no eyes killed	P.O.J. 2878. As for Q. 25.

* NOTE.—The term "heart" is used to describe the inner spindle of leaves just above the growing point ; a dead heart by no means indicates a dead stalk.

The indications from the above table are that Q.25 is definitely more susceptible than Co.290 and Q.813 and slightly more susceptible than P.O.J.2878. On the other hand, a very remarkable feature of these

observations on Q.25 is the fact that even though in many instances the heart has been killed by frost, and a brown sour rot has developed, the growing point has not been injured and a new heart has grown up and pushed out the old damaged one. It will also be noted that the eyes have survived in most cases—as is evidenced by the fact that they are swelling and shooting.

Taken by and large, therefore, it would seem that the frost damage to Q.25 is not as severe as it has seemed at first sight.

The Cane Grub Pest in the Mackay District.*

By W. A. McDougall.

THE problem of the control of "grey-back" grub damage to cane in this area is frequently discussed at the present time, and is of serious concern to quite a number of farmers. Often these discussions do not progress further than the subject of collection of beetles, although lately, probably through force of circumstances, some popular attention has been given to both the use of grub-resistant varieties and fumigation. It is not intended here to debate "fumigation *versus* beetle collecting." These two possible adjuncts to grub control are not strictly opposed and it has been repeatedly stressed that both, at their reputed best, are considered to be only of secondary importance in the central cane districts.

During the past three years several farmers in this district have had experience with fumigation. They have given it a trial and in this short time have noted some of its virtues and a few of its weaknesses. Many, I think, have decided to include it, where and when necessary, in their future farm routine. So far as these farmers are concerned this help in controlling grub attacks on their crops has come to stay. It seems as if time will increase their numbers, but even this does not mean that any of them will be contented—far from it—and no doubt their attitude is a correct and progressive one.

Fumigation is the one phase of grub control which shows clear-cut results. These are often very distinct and give us something which can be fairly accurately evaluated. When dealing with a project of this nature the enumeration of its weaknesses often helps to improve its detailed workings and administration and to place it in the general control scheme of the pest concerned.

Fumigation is expensive and is far from being "fool-proof" or a "cure-all." For success it must be handled promptly and with judgment based on experience and a thorough knowledge of the job. The mixed and late flights often experienced in the scattered areas constituting the Mackay Pests Board District may bring in the wet season as a factor limiting success. The unwieldy and widespread district, the varying conditions likely to be encountered in any year even in adjacent

* Address delivered on the occasion of Field Day at the Mackay Sugar Experiment Station, 1941.

localities, and the seasonal incidence and population fluctuations in any one of the small sub-districts, may strain the best of administrative and field efforts. Technically, fumigation could be placed on a much better footing if one difficulty could be overcome—i.e., if some method could be found of inducing grubs to move in under the stools at an early date. In any campaign there is always a small percentage of grub-infested fields which show an abnormal and unfavourable behaviour in this regard. These may be the cause of bitter disappointment both to the farmer and the Pests Board concerned. However, for the present, we have to take fumigation, technically at any rate, as it is. Many suggestions have been investigated but we are no nearer the solution of this small but important problem.

Perhaps enough has been said about the disabilities of fumigation. If these are examined carefully it will be found that the most important of them, so far as we in Mackay are concerned, are bound up with the size of the district and the periodic nature of the pest infestations experienced here. Primarily for these reasons, fumigation has never been advocated as a method of absolute control of grubs in the Mackay district. For us it has very definite, indispensable and valuable uses—also limits. In fact it is (and will prove to be more so in the future) an excellent secondary help, provided other measures work with it.

What other measures are possible? The first, and most popular, reply would doubtless be "collect beetles." From a district point of view this method is expensive, and although it costs the individual little in cash, it has been declared uneconomic. It is not easy to get down to hard facts with a control method of this nature, and it is particularly difficult to do so when the pest population fluctuates in erratic cycles and damage to the crop is, to some extent, governed by weather conditions. This type of control can be the subject for an endless debate and, depending on the audience, it could be carried on with equal facility by the same person from either side of the fence, provided he did not have to restrict himself to dealing with proven facts.

Let us now turn to the use of varieties in lessening grub damage to cane. We do not know of any variety which, at times, cannot be severely damaged by grubs. There are, however, some which stand up reasonably well to attacks by this pest. The three essentials of a grub-resisting variety are (1) it must resist at least all light grub infestations under all conditions; (2) it must not be particularly attractive to the beetles; and (3) its general agricultural qualities must make it a desirable cane for the locality concerned. Perhaps a short discussion of happenings in this district this year would help us at this stage and at the same time round off a suggested general scheme of grub control.

As in practically all other Queensland cane districts the effect of grub attacks on cane around Mackay this year has been more severe than usual. Damage ranging from very severe to "spotty" is noticeable in a number of localities. S.J.2 has been the worst sufferer and is the cause of much of the trouble. Two grubs per stool, or even less, has resulted in severe damage. Where located early, an infestation of this type in this variety has, of course, been fumigated. Co.290 has not fared too well either. A variety such as P.O.J.2878 under similar circumstances would not be troubled at all. Obviously the planting of much of our country with grub-resistant varieties would, in itself, go a long way in lessening grub damage throughout the area. It would

have other effects too: it would increase the actual efficiency of fumigation by confining it to reasonably sized areas of possible grub damage. It would also decrease the total district cost of grub control and this, in the long run, will be reflected in the Pests Board subsidy on fumigation. At the present time one major item holds back, not only the use of grub-resistant varieties in this area, but also a possible general increase in crop yields, and this is disease.

Disease has left us, so far as grub control is concerned, with a good superstructure (i.e., fumigation) and a non-existent foundation for which there does not seem to be a satisfactory substitute. There must, therefore, be a strain on the whole system. The one cure is prompt eradication of disease and non-approved varieties so that grub-resistant canes can be introduced and constantly watched by those responsible for the control of diseases.

In conclusion, a still further word of advice might be given about S.J.2. Unfortunately, the use of this variety in possible grub country is increasing. Perhaps next season's conditions may not favour the grubs to the same extent as over the past six months; nevertheless those farmers concerned should make contact with their Pests Board at the first opportunity.

"Badila Seedling."

Since the enactment of legislation relating to the growing of approved varieties of sugar cane the Bureau has had under observation a variety of cane which very closely resembled Badila. For that reason, and pending the carrying out of disease resistance trials, farmers were permitted to continue to grow this variety as Badila. It is now apparent that the varieties are distinct, but, as the disease reactions are the same as true Badila, it has been decided to include it in the approved variety list for certain mills in 1942.

The variety has also been known as Tableland Badila, but the name is undesirable since a great deal of true Badila has been taken up to the Atherton Tableland and grown there and then returned to the coast as "Tableland" Badila. It has, therefore, been decided to call the cane Badila Seedling since it is so closely related to Badila. This variety has been observed throughout the areas north of Cardwell and also in the Mackay district.

We do not advocate the variety in preference to Badila, and, indeed, it is very difficult to distinguish them. Farmers are therefore advised to consult the nearest field officer if in doubt as to the identity of the particular cane. Generally speaking, Badila Seedling is longer in the joint, somewhat thinner, and slightly darker in colour than true Badila; the most obvious difference, however, is the fact that Badila Seedling arrows very much more freely than Badila.

Growers are warned that this is by no means to be interpreted as a license to grow the several Badila-like seedlings which have been spirited away from the Experiment Station, and have been found from time to time—and are still being found—in the Hambleton and Mulgrave areas. The finding of such unnamed varieties on any farm will invoke punitive action on the part of the Bureau.

A.F.B.

Crotalaria usaramoensis—A New Legume.

By J. H. BUZACOTT.

DURING the past few years a number of legumes have been received from the Council for Scientific and Industrial Research and other organisations for trial at the Northern Sugar Experiment Station. Some of these have proved to be valueless for northern conditions, or unsuited to the practices of sugar cane agriculture, but among those received during 1939 (by courtesy of the C.S. and I.R.) was *Crotalaria usaramoensis*, a near relative of Gambia pea. It is a native of east tropical Africa, where it is extensively cultivated.

This species produced good growth on poor land in its early trials, so that enough seed was harvested to enable a larger scale trial of one-third of an acre to be sown in November, 1940. A good germination occurred and an excellent crop of green matter has been produced, coupled with a large number of nitrogen nodules on the roots. A sample portion of the crop, weighed during June, showed that there was 24 tons of green matter per acre standing in the field (see Fig. 30). The plants are very leafy and branching, and even after flowering they do not appear to become woody and therefore should offer no difficulty in subsequent ploughing operations.

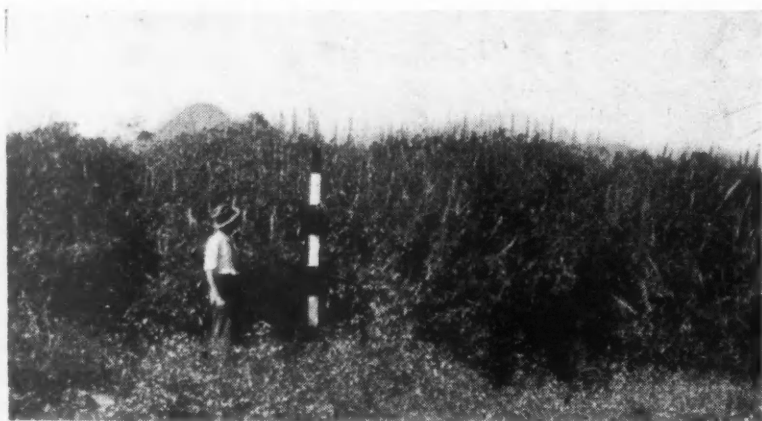


FIG. 30.—Illustrating an excellent crop of *Crotalaria usaramoensis*, Meringa Station.

In common with Gambia pea, the germination of *C. usaramoensis* is inclined to be erratic during the spring, when it is rather unusual to receive continual rainy weather in North Queensland. However, planted in the summer, when good rain is assured, *C. usaramoensis* apparently germinates reasonably well and produces an excellent stand both on poor forest soil and on better class loam. Likewise, in common with Gambia pea, the early growth of *C. usaramoensis* is very slow, which allows aggressive weeds temporarily to take charge; however, in this respect it is not quite so bad as Gambia pea, as it branches more and covers in somewhat earlier.

In spite of the excellent crops of Gambia pea which have been grown in the north, *C. usaramoensis* appears to possess several advantages over that variety for a long fallow crop: It has a slightly improved

early cover, due to its more branching habit. If planted late, so that wet season conditions ensure a fair germination, *C. usaramoensis* does not flower till about June, whereas Gambia pea flowers and seeds in April and therefore does not attain nearly so much growth as the former species. Again, even after flowering and seeding, *C. usaramoensis* continues to make growth for some months at least, whilst Gambia pea matures most of its seed within a limited period and then dies off. Finally, *C. usaramoensis* seems to be considerably more resistant to a disease of the "witches broom" type which, under certain conditions, attacks a high percentage of Gambia pea plants.

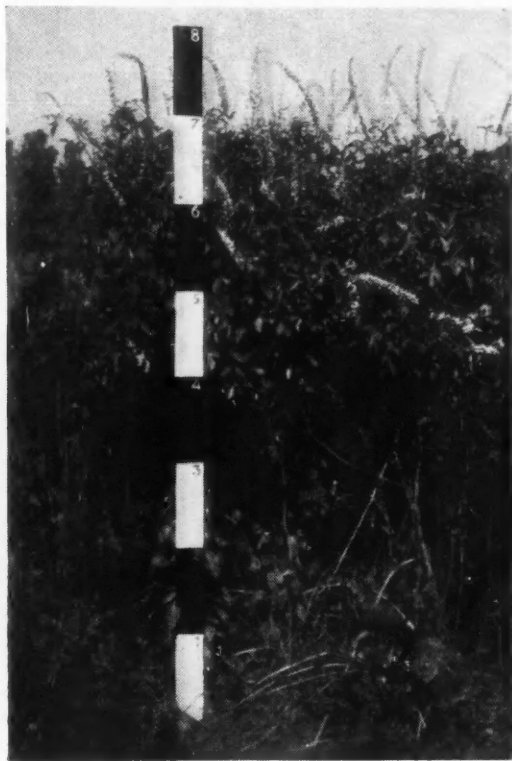


FIG. 31.—Close-up view of crop showing flower spikes.

The accompanying photographs (Figs. 30 and 31) of the new legume were taken during July, 1941, when the crop was approximately eight months old and just commencing to flower; however, since the photographs were taken the plants have grown another 2 feet in height and at the present time (early September) are in heavy green pod and showing a few mature pods.

Considering all its features, *C. usaramoensis* is one of the most promising green manure crops for a long fallow which we have yet handled and appears to be particularly well suited to wet soils in which other species of legume succumb to wilt. Its further performance will be watched with interest, and should it continue to show promise, it will have a less awe-inspiring name bestowed upon it.

The Identification of Three Species of *Lepidiota* which attack Sugar Cane.

By J. H. BUZACOTT.

AT the 1941 Conference of Pests Boards held at Ingham, it was requested that a means of separating the three species of cane beetle, *Lepidiota caudata*, *Lepidiota Frenchi*, and *Lepidiota consobrina*, and their respective grubs should be published in the "Canegrowers' Quarterly Bulletin" for the use of Pests Board officials. Accordingly the following notes on their identification have been prepared.

In the first place, it should be stressed that there is no essential difference in the damage which these three species cause to sugar cane; the principal difference in this respect is one of distribution, both from climate and from soil type. *Lepidiota caudata* is confined to northern soils of scrub origin and occurs most commonly in those areas such as Babinda and South Johnstone, in which a large portion of the cane-growing area was formerly under heavy scrub. *Lepidiota consobrina*, also a northern species, is confined to forest country and occurs almost solely in grey or white soils of a sticky nature; it is found mainly in the soils of this type in the Mulgrave, Hambleton, and Mossman areas. *Lepidiota Frenchi* has by far the widest distribution of the three species. It occurs in forest areas from Brisbane to Mossman and does most damage in rather friable soils, although it is not uncommon to find a mixed population of *L. Frenchi* and *L. consobrina* causing considerable damage to sugar cane in the clayey soils where the latter species occurs.

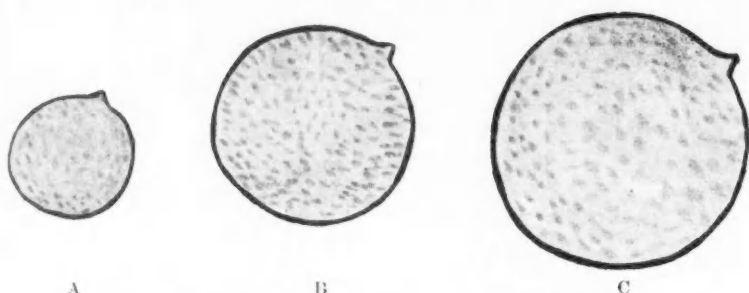


FIG. 32.—Comparative size of scales on wing-cases of (A) *L. caudata*, (B) *L. Frenchi*, and (C) *L. consobrina*.

The principal points of difference between the three species are listed below.

ADULT OR BEETLE STAGE.

- L. caudata*. Average length 25 mm. or 1 inch. Much glossier in appearance than *L. Frenchi* due to scales in punctulations of wing-cases being very small, .06 mm. in diameter (Fig. 32A). Front tibiae much like those of *L. Frenchi* (Fig. 33A). Scales on sclerites or plates of abdomen very sparse in centre and concentrated towards sides (Fig. 34A).
- L. Frenchi*. Average length 24.5 mm. or slightly less than 1 inch. Scales in punctulations on wing-cases whitish and visible to the naked eye, .10 mm. in diameter (Fig. 32B). Two main spurs of front tibiae form practically a right angle (Fig. 33A). Plates of abdomen with broad bands of scales right across and almost the width of each plate (Fig. 34B).

L. consobrina. Average length 28mm. or $1\frac{1}{4}$ inches. Scales in punctulations on wing-cases larger than in *L. Frenchi*, .13 mm. in diameter (Fig. 32C). Main spurs on front tibiae form acute angle and have a more rounded apex than those of *L. Frenchi* (Fig. 33B). Bands of scales on plates of abdomen narrower than in *L. Frenchi* (Fig. 34C).

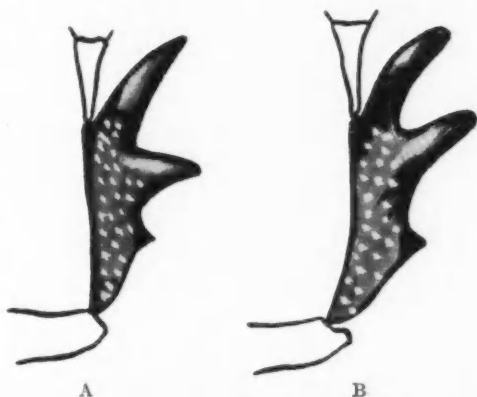


FIG. 33.—Fore tibia of (A) *L. Frenchi* and (B) *L. consobrina*.

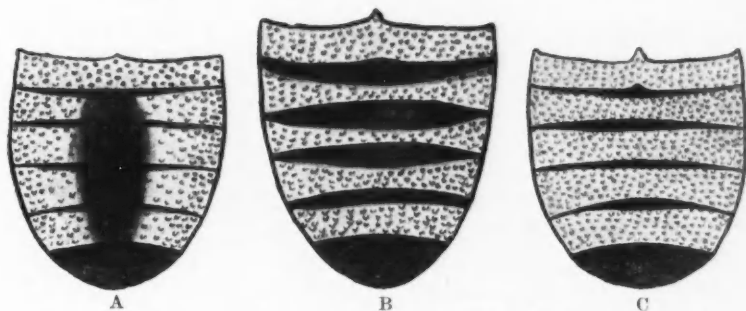


FIG. 34.—Disposition of scales on abdomen of (A) *L. caudata*, (B) *L. Frenchi*, and (C) *L. consobrina*.

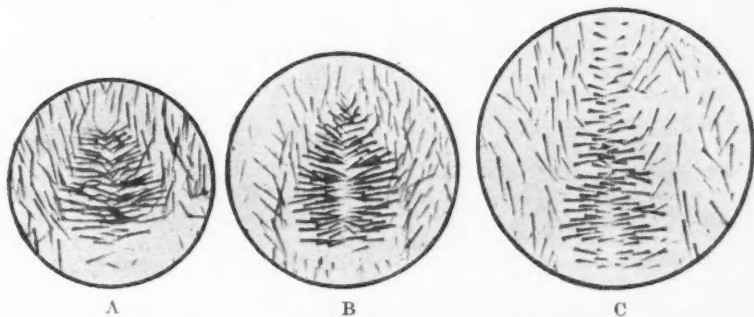


FIG. 35.—Disposition of bristles on underside of last segment of (A) *L. caudata*, (B) *L. Frenchi*, and (C) *L. consobrina*.

LARVAL OR GRUB STAGE.

- L. caudata.* Setae or bristles on underside of last body segment form a squat top-shaped patch and more or less meet over central path (Fig. 35A). Approximately 40 bristles form each side of patch. Width of head of III rd. stage is 7.5 mm.
- L. Frenchi.* Bristles on underside of last body segment form a top-shaped patch with a well-defined naked central path (Fig. 35B), approximately 50 bristles form each side of patch. Width of head of III rd. stage about 6.5 mm.
- L. consobrina.* Bristles on underside of last body segment form an elongated top-shaped patch with the narrow end prolonged in two rows of parallel bristles (Fig. 35C). Approximately 48 bristles form each side of patch. Width of head of III rd. stage about 7.2 mm.

Washers for Blundell Injectors.

By GEORGE WILSON.

THE matter of sources of supply of leather washers for use with the Blundell knapsack injector was raised at the Conference of Pests Boards held in Ingham last May, and the following notes are accordingly submitted in the belief that they will be of interest to Pests Boards or farmers possessing this type of injector.

The writer has maintained a satisfactory supply of washers by cutting them on the spot with the aid of a set of punches, as under:—

- Spear adapter leather washer (B.F.33)— $1\frac{1}{4}$ inch \times $\frac{7}{8}$ inch.
 Check valve body leather washer (B.F.17)— $1\frac{1}{8}$ inch \times $\frac{7}{16}$ inch.
 Hose nut leather washer (B.F.49)— $\frac{5}{8}$ inch \times $\frac{3}{8}$ inch.
 Check valve seating washer (B.F.19)— $\frac{7}{16}$ inch \times $\frac{1}{8}$ inch.
 Strap stud holes in shoulder straps— $\frac{3}{16}$ inch.

Due to the irregularity in the size of hose tails, it is sometimes found necessary to use washer No. B.F.17 instead of B.F.49, or else to trim the hose tail to reduce its size to $\frac{3}{8}$ inch.

The $\frac{1}{8}$ and $\frac{3}{16}$ inch units should be ordered as belt punches and the remainder as hollow punches; a "revolving punch" carrying six variable sizes could be purchased instead of the two small belt punches, but the edge will probably last longer in the case of the individual units. Punches calibrated to sixteenths of an inch are not usually stocked in country towns, and may, therefore, have to be ordered from the metropolis.

A Pests Board will use thousands of washers in a few seasons and, therefore, the use of a brass hammer is recommended in order to obviate "mushrooming" the heads of the punches. The writer uses a rather heavy hammer, the head of which is a cylinder of muntz metal, $4\frac{1}{2}$ inches long by $1\frac{1}{8}$ inch diameter, fitted with an ordinary engineer's hammer handle. This hammer is used for spear washers or when hammering near fumigant. A much lighter hammer, with a muntz metal head 4 inches long by $1\frac{1}{4}$ inch diameter, has been found useful for the medium and smaller-sized punches.

In deciding the size of punch to be used in cutting the washer for any particular part, measurements should be made on cut washers rather

than a direct measurement of the cutting edge of the punch, because the operation of the inside punch enlarges the outside diameter of the washer, the extent of this enlargement depending on how far through the punch is driven. Great care must be taken to keep the punch vertical on the surface of the leather, especially when cutting the check valve seating washer (B.F.19).

Washers should be cut on an "anvil" of soft wood, about 6 inches x 6 inches, and set on end so that the grain runs in the direction of the punch. Although soft, the wood should be firm grained in order to prevent excessive carry-through of the inner punch (*see above*). The end of the anvil should be sawn off frequently, to remove punch marks, in order that the punch will meet with uniform resistance and penetrate a uniform distance through each washer.

It is not practicable to cut the inside of the washers first, in order to prevent the spreading of the outside edge, because such procedure would result in a large proportion of the washers having the second cut "off centre," thus rendering them useless.

The plunger leather is the most troublesome packing in the injector, and it is desirable to try to improve its performance by studying its quality, size, lubrication, &c. Up to the present time the leathers on sale for use in primus pumps have been used almost exclusively on the injectors; however, they are usually made of leather which is too thin, while the walls slope outwards too much. In pumping a primus stove the pressure of the air being pumped spreads the leather out and makes it seal the chamber even when the leather is in rather poor condition. On the other hand, the upper plunger leather of the injector has practically no pressure against it, and must form a good packing by virtue of its own thickness, pliability, and coating of lubricant. It should, therefore, be leather of good thickness and have the walls vertical and slightly longer than the usual primus pump leather. The writer submitted a sample of a home-made leather of correct dimensions to a Queensland machinery firm which supplies leather buckets of all sizes, and the manufactured samples offered in response to the enquiry were superior in quality and cheaper in price compared with anything previously purchased; it therefore appears that if proper specifications are submitted when ordering leathers that a satisfactory type can be procured.

Mr. E. Blundell, the designer of the injector, has prepared a number of leathers of correct dimensions—using a lathe to apply the pressure. He has made available the following measurements and details for preparing the leathers:—

A good quality sole leather from the back of the hide must be chosen; it is cut into discs $1\frac{7}{8}$ inch in diameter and soaked in water for several hours before being pressed in the dies. The leather must approximate closely to $\frac{7}{16}$ inch in thickness; if too thin it will not retain its shape when moulded, and if too thick it will be nipped and torn between the dies. The outer die consists of a block of steel with a hole drilled $\frac{7}{16}$ inch in depth and $\frac{3}{4}$ inch in diameter; the inner die is solid round steel $\frac{1}{8}$ inch in diameter. The dies should be made with extensions for holding them in whatever appliance is to be used to apply the pressure. The disc of wet leather is placed over the mouth of the outer die with the rough (fleshy) side next to the die. The inner die is then brought against the outer face of the leather and used to force the leather right home in the hole in the outer die. The excess leather is

trimmed off with a sharp knife and the bucket taken from the die. A hole is then punched exactly in the centre of the end of the bucket. A $\frac{1}{4}$ inch punch will make a tight fitting hole on the plunger rod of the injector, so the leather will most conveniently be fitted by screwing it down the thread. A $\frac{5}{8}$ inch hole would make a rather loose fit. The finished bucket will be $\frac{1}{3}\frac{1}{2}$ inch long.

If full value of wages be allowed for making leathers by hand with the above apparatus, they will cost nearly sixpence each, as compared with two or three pence usually paid for primus stove leathers. However, the dies are not so hard to prepare as to deter a handy man from making a few buckets from first-class materials in order to avoid delays that occur when fumigating with inferior upper plunger leathers.

Mackay District Quarantine Area.

The attention of canegrowers in the Mackay district is directed to the necessity for becoming familiar with the restrictions on the removal of sugar cane which were imposed by a recent quarantine Proclamation. The quarantine area to which these restrictions apply is the area embraced by the mill areas of Farleigh, Racecourse, Pleystowe, Marian, Cattle Creek, and North Eton; in other words, the whole of the Mackay district with the exception of the Plane Creek mill area.

Briefly, the restrictions imposed are as follows:—

1. No person shall, except for milling purposes, remove or dispose of sugar cane of any variety from any farm on which downy mildew exists or has existed at any time within the preceding three years;
2. No person shall, except for milling purposes, remove or dispose of sugar cane of the variety Co.290 from any farm, whether diseased or not;

Unless in either case a written permit has first been issued by an inspector duly appointed under the Sugar Experiment Stations Act.

Therefore, any canegrower who desires to sell or give away plants of Co.290, or the owner of any diseased farm who wishes to sell or give away plants of *any variety*, should apply to officers of the Mackay Cane Disease Control Board, or the Mackay Sugar Experiment Station, for a permit to do so. The removal of plants without a permit in such cases will render the offender liable to prosecution and the infliction of a fine not exceeding £50.

The object of the restrictions imposed by this Proclamation is to stop the further spread of downy mildew disease. The disapproval of the variety P.O.J.2878 and the work of the Mackay Cane Disease Control Board have greatly reduced the amount of downy mildew disease in the district. Determined efforts are now being made to clean up the disease altogether, but these efforts will obviously go for naught if people are allowed to move diseased cane around the countryside. Co.290 is particularly dangerous in this respect as, next to P.O.J.2878, it is quite the most susceptible variety in the district.

No grower would knowingly send diseased plants off his farm, and consequently the imposition of the quarantine can impose no hardship on a man who has disease on his farm. There is likewise no hardship inflicted on growers with disease-free farms as all applications for permits will be given prompt attention.

A.F.B.

The Present Fertilizer Position.

By H. W. KERR.

FROM time to time we have placed before Queensland canegrowers developments in respect of the supply of essential fertilizer materials, in which most of our farmers are keenly interested. As such a large proportion of the ingredients used in compounding manures are imported, it is inevitable that supplies would be interrupted, at least in some degree, due to shipping shortage; but there have arisen further complications due to non-availability of these materials, notably nitrogen in the form of sulphate of ammonia.

It may be recalled that early in 1941 the Commonwealth Government agreed to permit the importation of some 17,000 tons of this substance, to make up the full annual quota required for all purposes in Australia. A shipment was actually prepared and was on the point of departure for Australia, when it was diverted at the last moment to other parts. As a result, Australia will be obliged to do the best possible for this year on home-produced sulphate of ammonia alone; and in view of increased demands for munitions purposes, it appears that between now and the beginning of 1942, a quota substantially less than one-half normal agricultural requirements will be allotted to Queensland.

This has necessitated a hurried attempt to introduce some form of rationing which will at least assure a proportion of their needs to all important agricultural industries which must have access to artificial nitrogenous fertilizer for profitable results. Having regard for stocks and probable supplies, it was determined that this end would best be served by allowing each canegrower (except those in the Lower Burdekin District) to purchase one-half of the quantity of this manure purchased during the corresponding period of 1940. The Burdekin area, which was precluded from purchasing potash when this material was first rationed, has now been granted a special concession insofar as sulphate of ammonia is concerned. These growers will be entitled to 10 bags for each 14 bags purchased in 1940.

It is appreciated that this ruling may prevent certain farmers who, due to special circumstances, did not happen to buy normal amounts of this class of manure during the period in question. This has been taken care of by enabling such farmers to submit an application form setting out certain facts and explanations, and, if it be considered that these warrant special consideration, a permit may be issued authorising the purchase of a prescribed quantity. These forms may be had from the fertilizer companies, from the Secretaries of District Cane Growers' Executives, or from officers of the Bureau of Sugar Experiment Stations.

While we wish that each canegrower should be justly treated in this regard, it should be understood that there is a definite shortage of the manure, and an application should not be submitted unless a strong case can be supplied in support thereof. We recognise that the present basis of fertilizer rationing leaves much to be desired, and it is anticipated that a new plan will be in operation for 1942, which will lead to greater all-round satisfaction. But it was necessary to do something at very short notice for this spring fertilizer season, and the expedient now in use was the only one possible in the circumstances.

Applications to Further Ratoon S.J. 4 and Clark's Seedling in the Mulgrave Area.

Although the further planting of S.J.4 and Clark's Seedling was prohibited in the Mulgrave area by quarantine Proclamation in June, 1938, and they were not included in the lists of approved varieties issued in 1939, 1940, and 1941, requests to be permitted to crop third ratoons of these varieties continue to be received.

As more than three years has elapsed since S.J.4 and Clark's Seedling became non-approved varieties, there has been ample time for the adjustment of any consequential interference with farm routine. Therefore, any further applications for permission to harvest third or later ratoons of either of these varieties during the 1942 season will be granted in exceptional cases only.

No permit will be granted if gumming disease has been found on the farm in question, or on neighbouring farms, and no application received after 31st December, 1941, will be considered.

H.W.K.

Canegrowers' Varietal Returns.

In January or February of each year, the mill provides each of its suppliers with varietal census forms, which the grower is required to fill in and return to the mill manager. The particulars required are the areas of each cane variety planted and harvested during the preceding calendar year.

Most of these forms are dealt with promptly by the farmer, but in some cases they are put aside and forgotten, while in others insufficient care is exercised in supplying correct and accurate information.

We therefore appeal to every farmer to fill in and return these forms as soon as possible after they are received; attention should be paid to the accuracy of the information supplied, and above all, nothing should be overlooked. Plantings of "experimental varieties" made under the authority of the Bureau or other authorised persons must be declared. Special attention is directed to the description of varieties; if P.O.J.2878 is recorded as P.O.J.2714, it may mean considerable waste of time for our field officer to visit the farm and check the correctness of an alleged planting of non-approved cane.

H.W.K.

New Quarantine Conditions for the Moreton Mill Area.

The attention of canegrowers in the Moreton Mill area is directed to the following alterations to Quarantine restrictions applying to that area:—

1. Proclamations Nos. 8 and 9 have been cancelled. Proclamation No. 8 applied to that part of the Moreton Mill area lying east of the railway line and south of the Yandina-Coolum road, and placed restrictions on the removal of sugar cane or the planting of P.O.J.2878 on farms in that area. Proclamation No. 9 had reference to a small area on the Mapleton Range, and prohibited the removal or planting of P.O.J.2878.

2. Proclamation No. 13 has been gazetted in place of Proclamations Nos. 8 and 9. It applies to the **whole** of the Moreton Mill area, and imposes the following restrictions:—

- (a) No variety whatsoever may be removed from any farm which has been Fiji disease infested within three years prior to the proposed removal of the cane.
- (b) On any farm which is Fiji disease infested, or on which Fiji disease has occurred during the preceding three years, sugar cane of the variety P.O.J.2878 cannot be grown beyond the third calendar year after the calendar year of planting, except as permitted.

For example: On any farm where Fiji disease has been found at any time since 1st January, 1938, no P.O.J.2878 which was planted in 1938 (or earlier) may be grown and harvested in 1942 unless a written permit is first given by the Director.

- (c) The Moreton Mill is prohibited from accepting or milling any P.O.J.2878, delivered from a diseased farm, which has been grown during the fourth or later calendar year after the calendar year of planting.

This new Quarantine Proclamation affects every canegrower supplying the Moreton Mill. Any grower, on whose farm Fiji disease has been found since 1st January, 1938, and who wishes to further ratoon any field of P.O.J.2878 which was planted in 1938 (or earlier), should make immediate application for a permit to the Director, Bureau of Sugar Experiment Stations, William street, Brisbane, B.7. When making such application growers should include the following information:—

1. Name and address of grower.
2. Assignment.
3. Area and date of planting of the field of P.O.J.2878 in question.
4. Disease found in the field.
5. Reasons for application.

A.F.B.

Prosecutions under the Sugar Experiment Stations Acts.

Warnings that the provisions of the Sugar Experiment Stations Acts relating to non-approved varieties would be strictly enforced were published in the Quarterly Bulletins for October, 1940 (page 59) and April, 1941 (page 123). In spite of such warnings a number of farmers failed to destroy small lots of non-approved canes and were served with eradication orders. Two growers in the Mulgrave area failed to heed the orders issued to them, and upon being prosecuted before the police magistrate were convicted and fined £5 and £10 respectively.

Growers are warned that the growing or possession of non-approved varieties is a breach of the Act and may be summarily followed by prosecution. Heretofore, eradication orders have been issued when non-approved canes have been found, but this policy of granting an additional period of grace, as it were, cannot be continued indefinitely. Any grower finding odd stools of non-approved varieties would be well advised to avoid trouble by digging them out immediately; the amended Act has been law for three years, and ignorance can no longer be accepted as an excuse.

A.F.B.

"Susceptibility" and "Tolerance" to Mosaic Disease.

A canegrower from the Plane Creek area has written to us asking for an explanation of the difference between susceptibility to mosaic disease and the extent to which the disease causes crop losses.

The term "susceptible" is often used rather loosely to denote both the readiness with which a variety contracts a particular disease and the fact that it suffers considerable losses when attacked by that disease. Actually these two things do not always go hand in hand; a variety might contract a disease very readily and yet suffer little loss of growth, and *vice versa*. Strictly speaking, therefore, the term susceptible in respect to any disease should only be applied to a variety which contracts that disease readily, while the terms "tolerant" and "sensitive" should be applied when the variety is little affected or greatly stunted, by the disease, as the case may be. For example, the variety P.O.J.213 contracts mosaic very readily but suffers little reduction in yield in consequence—this variety, then, is susceptible but tolerant; on the other hand, Q.813 does not contract mosaic very readily, but when it does become diseased it is usually badly stunted—that is, it is comparatively resistant, but sensitive to the disease.

Of the varieties approved in the Plane Creek area, E.K.28, Clark's Seedling D.1135 1900 Seedling, Oramboo, and S.J.2 are both susceptible and sensitive to mosaic; Badila is moderately resistant and moderately tolerant; Q.813, moderately resistant and sensitive; Co.290, moderately susceptible but tolerant; while P.O.J. 2714 2725, and 2878 are highly resistant. The behaviour of Q.20 requires further observation, but it appears to be moderately susceptible.

A.F.B.

Cultures of Nitrogen-fixing Bacteria for the Inoculation of Cowpea Seeds.

Canegrowers are again reminded that the Bureau is prepared to supply, on application, cultures for the preplanting inoculation of seed of Poona pea and other varieties of the Cowpea group used as green manure crops. The inoculation is a very simple process which takes up very little of the farmer's time, and it will ensure the crop's having an efficient strain of nitrogen-fixing bacteria available for the formation of root nodules.

Inoculation of seeds with nitrogen-fixing bacteria is not a magic wand and it is still necessary to have good seed, a good seed bed, and suitable weather conditions in order to obtain a good crop. But if these other factors are favourable, inoculation means that the maximum quantity of atmospheric nitrogen will be "fixed" in the plants and later added to the soil.

In these days of reduced and rationed nitrogen supply it is obviously necessary to grow as good a green manure crop as is humanly possible.

Applications for cultures should state the number of bushels of each variety of seed it is desired to inoculate and the date about which seed planting of the green manure crop is expected to be carried out. Applications should be addressed to "The Director, Bureau of Sugar Experiment Stations, Department of Agriculture, Brisbane, B.7." and be accompanied by postal note or stamps to the value of one shilling.

